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ABSTRACT

This paper examines aspects of some World Wide Web-based educational telecomputing projects to illustrate 10 different project Web page functions. These include: (1) giving a project overview or introduction to the goals and operational structure for the project; (2) announcing curriculum-based projects, inviting participation, and providing links to relevant networked resources; (3) providing instructions to telecollaborators on how to participate in the project; (4) serving as virtual places for participants to exchange information; (5) creating an open-ended form of multimedia communication; (6) providing project-related resources; (7) presenting chronologies of past and ongoing project work; (8) providing viewing space to showcase participants' creations; (9) serving as multipurpose centers, combining several project-related functions; and (10) offering electronic services that can help to initiate new curriculum-based telecomputing projects. Sample Web pages are included to illustrate these functions. (AEF)

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Form Follows Function: Designing Web Pages to Support Educational Projects

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ED 421 103

Curriculum-based telecollaborative projects happen both across and within participating school sites; they have no one geographic location. It is helpful, therefore, to create a central, virtual space for sharing information about project-related activities. Many online project directors use World Wide Web pages for this purpose.

Eliel Saarinen (1873-1950), a Finnish architect and city planner who moved to the United States in the 1920's, was quoted in the July 2, 1956 issue of *Time* magazine as having said:

> Always design a thing by considering it in its next larger context—a chair in a room, a room in a house, a house in an environment, an environment in a city plan. (Tripp, 1970, p. 149)

Saarinen's words convey wisdom to those of us planning curriculum-based educational telecomputing projects that will be supported by Web pages. The "next larger context" for project page design is the variety of *functions* that designers intend the WWW site to serve and support. Project pages should be designed with these functions in mind. Before offering Web documents to an online community, we should answer questions like these:

- Who will be interested in exploring the site?
- What types of information should be available at the site to address different audiences' interests?
- How should this information be presented, so that it is maximally helpful to project participants and/or Web strollers?

Currently, Web page design is addressed primarily in terms of *form* and *content*, rather than function. We consider, for example,

- layout options (i.e., "Should we use frames?").
- overall structure (i.e., "Should the site be one long page with links to subsections or multiple, shorter pages?").
- transfer time (i.e., "How many graphics should I put on this page?").
- browser differences (i.e., "Will *Lynx* users be able to benefit from my site?").
- readability (i.e., "Does this combination of background pattern and text color make the page difficult to decipher?").
- aesthetics (i.e., "Is the combination of colors, items, and spacing pleasing to the eye?").

In this paper, I will suggest that we also consider project-related *functions* as we design WWW documents. Any architect (including Mr. Saarinen) would strongly suggest that "form *follows* function."

Project-Related Page Functions

Let's examine aspects of a few Web-based educational telecomputing projects to illustrate ten different project page functions. More information about each curriculum-based effort is available on the Web, using the either the project URLs provided below or a site containing links to examples of each function. This centralized page function resource can be accessed online at: http://ccwf.cc.utexas.edu/~jbharris/Virtual-Architecture/.

Project Overview

Web sites can serve as succinct **introductions** to the goals and operational structures for educational telecomputing projects.

iEARN's ongoing Rope Pump Project, for example, which brings clean water to villages in Nicaragua in the form of a rope-operated water pump, is described on the project's Web page as follows:

> In rural villages in Nicaragua, many children and adults are subject to disease and death because of lack of access to clean water. Through the Rope Pump Project, we are collaborating with an organization called El Porvenir ("The Future") which worked on small water projects in Nicaragua. Students in I*EARN have raised over $10,000 to fund the digging of wells and the installation of rope pumps in villages where people were drinking from polluted streams or from wells that had been contaminated by dirty buckets being thrown into them. We have received numerous letters from children in those villages, thanking our students for providing the materials (the Nicaraguans provide the labor) for their wells and pumps and describing their lifestyles and

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goals. We are in the process of setting up a system whereby students can communicate with children in those villages on a regular basis. (http://www.iearn.org/iearn/projects/pump.html)

The page also provides information on the ages for which, languages in which, and dates that the project has been functioning, along with an E-mail address to use to write for more information.

Project Announcement

Web sites can **announce** curriculum-based projects, inviting participation and providing links to relevant networked resources.

The well-organized and well-detailed announcement for the Boreal Forest Watch project in Saskatchewan and Manitoba, Canada, for example, offers clearly-stated explanations and descriptions of purposes, plans, and collaborators for this ambitious ecology project.

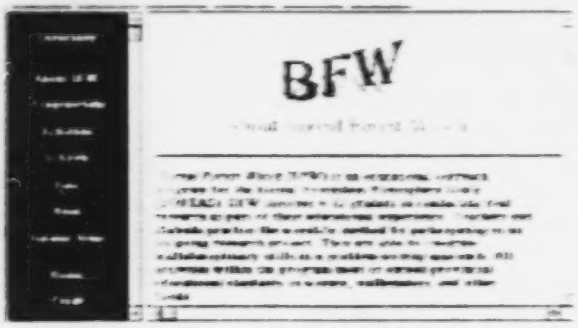

Figure 1. Boreal Forest Watch Project Announcement

As you can see in Figure 1, many aspects of the project can be learned about using its Web site, including descriptions of component activities, information about participating schools, plans for creating the database of observational data, and announcements of upcoming project-related events. There is also an index of similar projects and content-related information on the Web provided for the site's visitors.

Project Instructions

Web sites can provide specific **instructions** to telecollaborators on how to participate in the educational project.

iEARN's excellently organized Learning Circle global classroom projects (http://www.iearn.org/iearn/circles/lc-home.html), for example, are supported by a hypertextually linked set of carefully crafted and information-rich Web pages, which provide specific step-by-step instructions for project participation. A small section of the main page at this site appears in Figure 2. Please note the many active links to documents supporting each stage of project work.

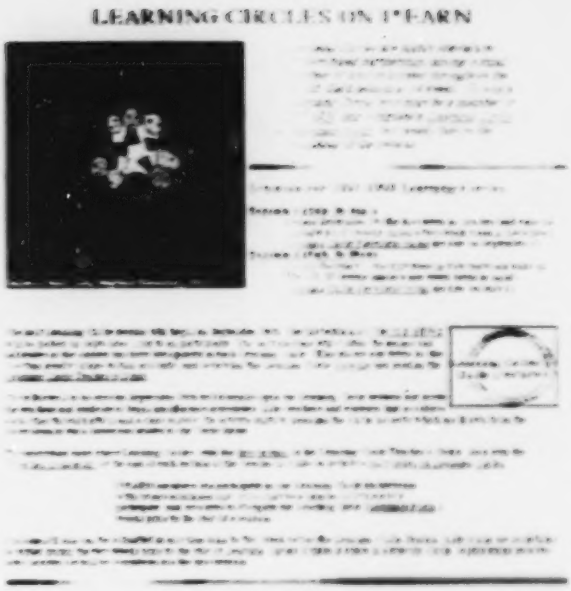

Figure 2. Instructions for Participation in I*EARN's Learning Circles

The page also contains information on joining I*EARN, links to conferencing spaces in which project partners communicate, links to custom-designed Web page publication aids, and a chronologically organized timeline for the current session of Learning Circle telecollaboration.

Information Repository and Exchange

Web sites can serve as virtual places for project participants to **exchange information**.

KIDLINK's long-term Multi-Cultural Calendar database creation project site (http://www.kidlink.org/KIDPROJ/MCC/) cross-indexes student-written depictions of hundreds of holidays and festivals from around the world.

Figure 3. KIDPROJ's Multicultural Calendar Project Main Page

As you can see in Figure 3, the holiday descriptions are accessible by month, holiday name, country, author, and user-supplied keywords. A World Wide Web-based form is also available at the site, so that new entries for the holiday

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database can be submitted more easily. A portion of this form is included in Figure 4.

Figure 4. KIDPROJ's Multicultural Calendar Holiday Entry Form Excerpt

Context for Project-Related Communication

Web pages can be co-constructed by project participants, creating an open-ended form of **multimedia communication**.

The Electronic Emissary telementoring project (http://www.tapr.org/emissary/), which "matches" volunteer subject matter experts with students and teachers interested in inquiry-based learning in the experts' specializations, has seen a few electronic teams co-create Web pages to facilitate their virtual interactions. This is especially effective when pictures or diagrams need to be concurrently viewed, and can be supplemented by realtime audio/video interaction using *CUSeeMe*.

For example, a meteorologist working for the National Center for Atmospheric Research in Colorado helped a sixth-grade class in Texas learn about atmospheric science, in part, by suggesting an experiment that required the assembly of a device that would help them to "measure radiative processes." The scientist posted a picture of the device on the common page, as a beginning to an ongoing, multimedia discussion of the results that the planned experiment yielded.

Project Support

Web sites can serve as organized collections of **project-related resources**.

CoVis' rich and well-organized site (http://www.covis.nwu.edu/) offers a plethora of materials that can be used by participants as they explore geosciences in telementoring contexts, "learning through collaborative visualization."

Figure 5. CoVis Project Main Page

Figure 6. Hobart-Malang E-Mail Project Header

The key to making project support sites maximally useful to project participants is to organize the materials offered for quick and efficient access. CoVis' main menu, shown in Figure 5, reflects the care and thought that project coordinators have put into the functionality of the project's Web site.

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Project Chronology

Web sites can present chronologies of **past and ongoing project work**.

The rich and varied nature of the Hobart - Malang Electronic Mail Project (http://www.tas.gov.au/fahan/Compute/indo.html) is excellently reflected in the project's detailed and visually appealing Web site.

This multi-year, multi-class, multifaceted, emergent keypals project involved Year Four students in Hobart, Australia and Malang, Indonesia, who wanted to learn about each other's cultures, countries, and ways of life. Many topics were discussed, many sets of materials were exchanged, and many learning products were created in the course of the exchange. Much of this is available for perusal at the site, richly illustrated with children's works, photographs, project artifacts, and descriptive text. Hints of the incredible variety represented can be discerned by looking at a portion of a list of active links to project-related materials, as pictured in Figure 7.

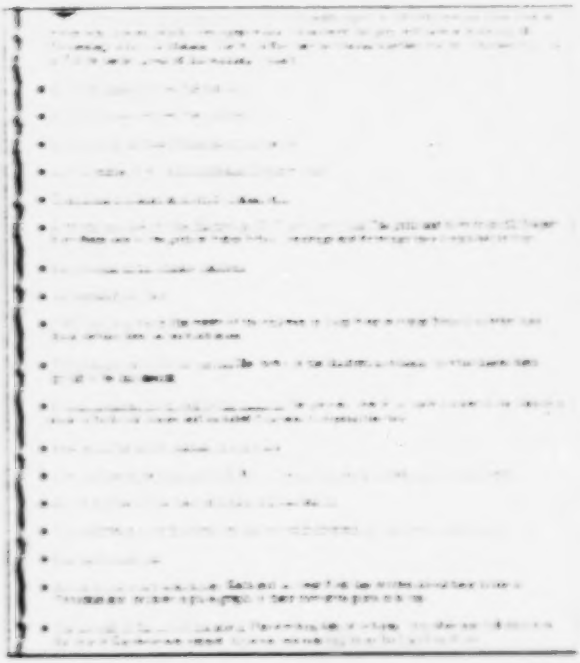

Figure 7. Hobar-Malang E-Mail Project Partial Page Contents

Showcase of Participants' Works

Web sites can provide viewing space to share project **participants' creations**.

Marian Herman's International Peace Museum (http://www.ih.k12.oh.us/ps/peace/), is a thematic project for students in kindergarten through grade 3.

Figure 8. International Peace Museum Virtual Entrance

The project invites young children to "think about peace and the importance of peace," as its creator has said.

This Web project and the museum that it creates might actually be able to affect the future of the world in some small way. It's an exciting thought. (http://www.hmco.com/hmco/school/projects/peacemuseum.html)

Participating students in different schools from around the world are asked to read books about peace, discuss the ideas they encounter in class, then "decide what peace means to them," writing a statement or poem and illustrating it. These creations are then posted at the Peace Museum site, but in a creative and educational way. Contributions from other classes are organized into wings of the virtual museum, as seen in Figure 9.

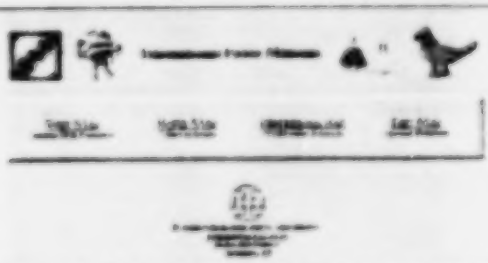

Figure 9. International Peace Museum Map

In the North Wing, for example, are links to collections of peace works from other schools in the United States:

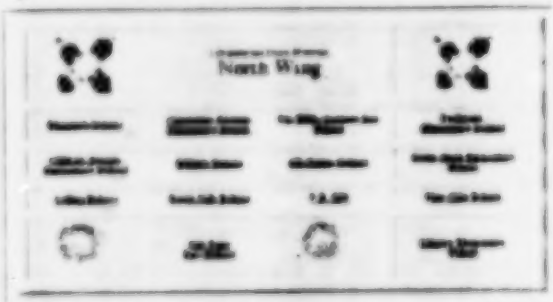

Figure 10. International Peace Museum, North Wing

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Students at the Manaugh School in Cortez, Colorado, for example, created a mural and poem that illustrates the potential power of thematically-organized pro[illegible]s such as these:

We at Manaugh have a dream...
That Native American, Hispanic, Hawaiian, and Caucasian kids can all play together on the same monkey bars.
That all kids are treated equally.
That no one shall fight anymore.
That everyone can share friendship, harmony and peace.
Freedom is all that matters.

Mrs. Herrick's Reach Class, Cortez, Colorado USA
(http://www.ih.k12.oh.us/ps/peace/cortez/cortez.htm)

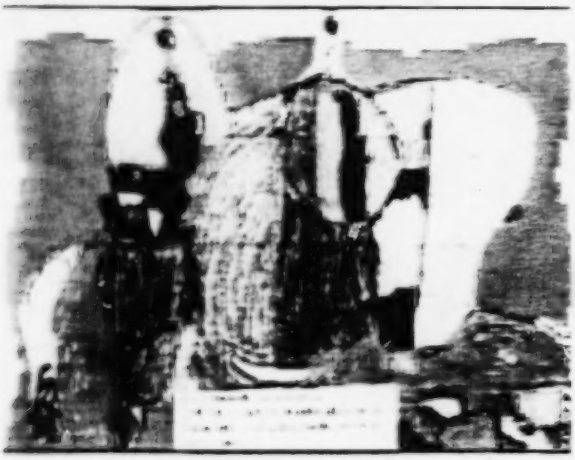

Figure 11. International Peace Museum, North Wing Exhibit

Project Center

Web sites can serve as **multipurpose centers**, combining several of the project-related functions listed above.

The home page for Noelle Kreider's Read to Write Project (http://www.itdc.sbcss.k12.ca.us/projects/kreider/index.html), an effort to inspire students to immerse themselves in particular literary genres first by reading, then by creating and publishing that type of writing, shows a selection of current, future and past topics for exploration.

Yet once one of these options is selected, we see how engaging language, white space, and well-placed illustrations can be used to make a resource-rich project center quite easy to navigate. The main page for the Historical Biographies section, for example, illustrates well how many of the page functions mentioned earlier in this section can be combined to create an information-rich, facilitative, multipurpose "virtual center" for an educational telecomputing project.

As you can see by the list of topics in the left-hand menu in Figure 13, this project's schedule, participants, online discussions, student works, resources, registration, and instructional suggestions are easily accessible from this well-presented page.

Figure 12. Read to Write Project Main Page

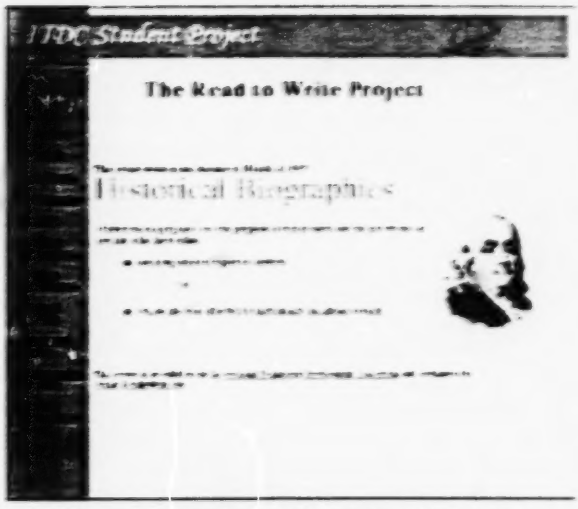

Figure 13. Read to Write Project Historical Biographies Menu

Project-Spawning Service

Web sites can offer **electronic services** that can help to initiate new curriculum-based telecomputing projects.

A growing number of services that help teachers and students locate information and interpersonal contacts with which they can begin new projects are now available on the

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Web. Notable among these are keypal and global classroom partner locators, such as:

- the Intercultural E-Mail Classroom Connections service (http://www.stolaf.edu/network/iecc/)
- eMail Classroom Exchange (http://www.iglou.com/xchange/ece/index.htsnl)
- Classroom Connect's Teacher Contact Database (http://www.classroom.net/contact/)
- Keypals International (http://www.collegebound.com/keypals/)
- Mighty Media's Keypals Club (http://www.mightymedia.com/keypals/)
- Dave's ESL E-Mail Connection(http://www.pacificnet.net/~sperling/guestbook.html)
- and Virtual Handshake (http://ananke.advanced.org/3174/), shown in Figure 14, which offers interpersonal connections in seven different languages: English, Spanish, French, German, Afrikaans, and both SJIS and rooma Japanese.

Figure 14. Virtual Handshake Language Selection Menu

Curriculum-based project planning tools are beginning to show themselves online, also. Notable among these is Pacific Bell's Filamentality (http://www.kn.pacbell.com/wired/fil/), a well-executed instructional design tutorial that helps its users to create WebQuest-like teleresearch sites to be used for instructional purposes. In the words of its witty creator,

What Exactly Does this Filamentality Do?

Maybe it doesn't slice, dice, or chop, but Filamentality does blend your learning goals with the outrageous resources available on the Web. How does Filamentality do it? By guiding you through the complete instructional design process. Okay, okay, we'll tell you in real English: Filamentality works its magic with online ideas to help you pick a topic (if your brain is drained), Mentality Tips for things like searching the Web, a bunch of "fill-in-the-blanks" to gather good Internet sites, and interactive pages that help you shape your ideas around whatever specific goal you have, and then, presto change-o, gives you your very own Web page on the Internet.http://www.kn.pacbell.com/wired/fil/)

Sound too good to be true? If so, why don't you go to Filamentality's site and check out the resources there for yourself?

The *Next* Next Larger Context: Purpose

Hopefully, the ten Website functions explained and illustrated above will help you to allow function to drive form as you design Web pages to support current and future educational telecomputing projects. I would be remiss, however, if I did not urge us all to continue to follow the pattern of Saarinen's sage advice by considering function in terms of its next larger context: purpose. For, as Norbert Wiener wrote in 1954 in *The Human Use of Human Beings*,

> There is one quality more important than "know-how"...This is "know-what," by which we determine not only how to accomplish our purposes, but what our purposes are to be. (Tripp, 1970, p. 524)

In the context of educational activity design, the *next* next larger purpose always refers back to curriculum-based content and process goals. Telecomputing is not, and should not be treated as, another curriculum. Instead, it can serve existing and emerging teaching/learning goals in rich, authentic, and forward-thinking ways.

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